

## MISSING DIE DETECTION

### ABSTRACT

- 5 An indication of whether or not a target object is present at a site of a collet assembly is derived by monitoring light reflected from the site. The use of reflected light enables the presence of objects to be detected, especially transparent objects. In a preferred arrangement for determining if a sapphire die is present in a die-handling collet assembly, light from a source is collimated or
- 10 focused into a narrow beam and directed through a beam splitter at the target site of the collet assembly. Light reflected from the surface of the die is further reflected by the beam splitter toward a photo-sensor. The reflected light is measured when the collet passes over a dark background while on the way to deliver a die at a bonding position and again while returning after attempting to
- 15 place the die at the bonding position. A determination of a die present in the former and absent in the latter is indicative of a well-placed die at the bonding position.

(Figure 3)

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